



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/724,403	11/27/2000	Shinji Maekawa	07977/258001/US4448	7575
26171	7590	12/14/2004	EXAMINER	
FISH & RICHARDSON P.C. 1425 K STREET, N.W. 11TH FLOOR WASHINGTON, DC 20005-3500			HUYNH, YENNHU B	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/724,403

Applicant(s)

MAEKAWA, SHINJI

Examiner

Yennhu B. Huynh

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2004.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 7-9, 20 and 60-71 is/are pending in the application.
4a) Of the above claim(s) 5, 6, 10-19 and 21-59 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-4, 7-9, 20 and 60-71 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the Amendment filed on 6/14/04.

Election/Restrictions

Currently, claims 1-4, 7-9, 20 and 60-71 are pending.

Claims 5-6, 10-19 & 21-59 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected claims, there being no allowable generic or linking claim. Election was made without traverse in Paper No. 9.

Priority

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in JP 11-336850 on 11/28/2000. It is noted, however, that the certified copy of the Japanese application has not received as required by 35 U.S.C. 119(b).

Information Disclosure Statement

The information disclosure statement filed on 12/2/02 is being considered by the examiner.

Oath/Declaration

Oath/Declaration filed on 11/27/00 is accepted.

Specification

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1,2,7,62 & 67-71 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamazaki et al. (6,693,044B1).

Yamazaki et al. disclose:

-Re. claim 1: forming a silicon semiconductor film 201 over the substrate 200 forming a material layer 205 by LPCVD in contact with a semiconductor film, whereby impurity element is gettered into the material (col. 8 lines 38-60 and col. 12 lines 57-60)

Regarding the "material having a tensile stress of 8×10^9 dynes/cm²" limitation in the above claims, this is presumed to be inherent to the disclosure of Yamazaki et al., per MPEP 2112.01, because their method are essentially identical to the applicant's method as being claimed in claims 2,3 that the material is formed by LPCVD, and claims 67-70 that the material is selected from nickel or platinum.

-Re. claims 2,7 & 62: Yamazaki et al. also disclose wherein the material is formed by LPCVD, and within a temperature range at 700 C degrees (in the range of 500 C –900C degrees) (col.12 lines 57-60).

-Re. claims 67-71: Yamazaki et al. also disclose wherein the impurity element is a metallic element selected from the group consisting of nickel, iron, cobalt, ruthenium, rhodium, palladium, osmium, iridium, platinum, copper and gold (col.21 lines 17-20).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the

Art Unit: 2813

subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3,4,8,9,20,60 & 63- 66 are rejected under 35 U.S.C. 103(a) as being unpatentable Yamazaki et al. (6,693,044B1) and Yonehara et al. (U.S. 5,670,411).

-Re. claims 4, 9, 20, 60 & 64: Yamazaki et al. disclose substantially all of the claimed features, but do not disclose the forming LPCVD with chloride gas (cls. 4, 9 & 64); wherein the Cl_2 is a mixture gas of any one of SiCl_4 , SiH_2Cl_2 , SiCl_3 or Si_2Cl_6 (cl.20 & 60).

Yonehara et al. disclose impurity element is gettered or suppressed to the epitaxial material layer 302 that used in combination with silicon nitride, to prevent crack due to internal stress of the film itself, which include wherein the material is formed by LPCVD with a gas containing chlorine and is a mixture gas of any one of SiCl_4 , SiH_2Cl_2 , SiCl_3 or Si_2Cl_6 (col. 8 & 9, lines 33-2).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine Yonehara et al. 's mixture gas containing chlorine, into the method of Yamazaki et al., to control the growing of impurity diffusion during heating process.

-Re. claims 3, 8, 63 & 66: Yamazaki et al. disclose substantially all of the claimed features, but do not disclose wherein the material is formed by LPCVD within a

Art Unit: 2813

pressure range of between 0.1 and 3 Torr (cls. 3,8 & 63); and wherein a composition ratio of N/Si in the silicon nitride film is .2 to 1.4 (cl.66).

With respect to claims 3, 8, 63 & 66 the pressure of material CVD forming, and the ratio between nitride and silicon are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art, As noted In re Aller 105 USPQ233, 255 (CCPA 1995), the selection of reaction parameters such as temperature and concentration would have been obvious.

"Normally, it is to expected that a change in pressure, temperature, or in range of ratio, concentration, cycles, thickness, would be an unpatentable modification. Under some circumstance, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality ... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller 105 USPQ233, 255 (CCPA 1995). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmischer 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

-Re. claim 65: Yamazaki et al. also do not disclose wherein the material is a silicon nitride film formed by LPCVD.

Yonehara et al. also disclose wherein the material 303 is a combination of a silicon nitride film 303' formed by LPCVD (col.8 lines 55-58).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine Yonehara et al. 's material in a silicon nitride, into the

method of Yamazaki et al., to make effectively in crystallization semiconductor film and prevent cracks due to internal stress.

Claim 61 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al. (6,693,044B1) in view of Yamazaki et al. (U.S. 6,444,390 B1).

Yamazaki et al. disclose substantially all of the claimed invention as being in the claim 61, but do not disclose removing the material having tensile stress, and forming a gate insulating and a gate electrode.

-Re. claim 61: Yamazaki et al. (6,444,390B1) Removing the germanium material (col. 4, lines 23-33) remaining in polysilicon film 501 having a tensile stress (col. 5 lines 31-34), and forming a gate insulating 205 and a gate electrode 206 (col. 6, lines 47-53 and col.7, lines 50-63, fig. 2A).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Yamazaki et al. ('390)'s removing the material having tensile stress from the semiconductor film, into the method of Yamazaki et al (6,693,044B1), to crystallize semiconductor film for forming the gates.

Pertinent Prior Art

Takizawa et al. (U.S. 5,734,195) disclose a semiconductor wafer having a sub-surface getter region. The structure includes a wafer, a second element ion implanted into the substrate wafer and accelerates oxygen precipitation to form crystal defects and

these crystal defect serve as gettering site and stress is generated, wherein the stress itself serves as a gettering site (col.1, lines 50-63, col. 2 & 3, lines 23-6+).

Kaoru (JP 7201842 A) disclose forming a gettering region in a scribing line on a surface of a wafer. The process includes a silicon substrate is selectively oxidized after a polysilicon film for relaxation of stress is removed. The stress is enlarged so that a large amount of crystal defect as gettering source is induced in the silicon substrate (Abstract).

Response to Arguments

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection with Yamazaki et al. (6,693,044).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yennhu B Huynh whose telephone number is 571-272-1692. The examiner can normally be reached on 8.30AM-7.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on 571-272-1702. . The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or

Art Unit: 2813

proceeding should be directed to the receptionist whose telephone number is 703-308-7724

Yennhu Huynh

11/08/04


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800